# Fischer-Tropsch Diesel — Meeting the California Supply Challenge

Alternative Diesel Fuels Symposium
Presented by CEC/CARB
Sacramento, California

By Dennis L. Yakobson Rentech, Inc. August 19, 2003

# Agenda

- Quick Overview of Rentech Fischer-Tropsch Diesel (FTD)
- Viable FTD supply options
- Supplying California with Competitively Priced FTD
- Where Do We Go From Here?

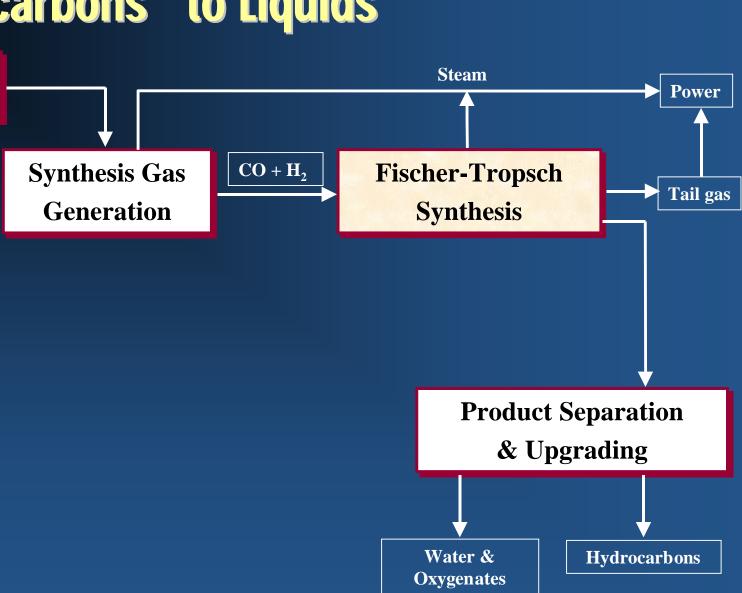
## **Rentech Background**

- Rentech was formed in 1981 specifically to develop Fischer-Tropsch technology
  - Patented/proprietary technology
  - Iron catalyst development
  - Slurry bubble column
  - Synhytech commercial demonstration
- Became a public company in 1991
  - Traded as RTK on the AMEX

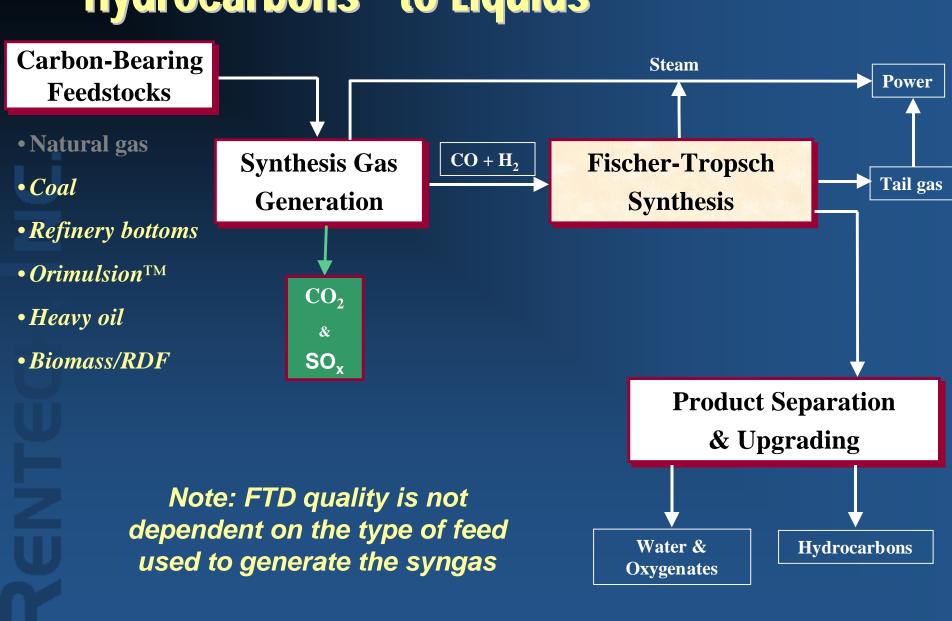
# **Hydrocarbons to Liquids**

Carbon-Bearing Feedstocks

• Natural gas



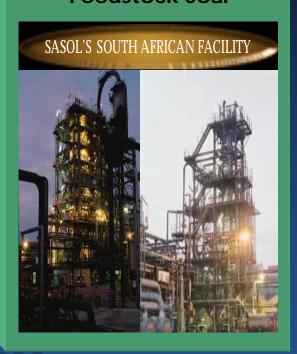
# **Hydrocarbons to Liquids**



#### Today s Sources of FTD are <u>not</u> Domestic

#### SASOL (S. Africa)

- 44 years commercial
  - 160,000 b/d+
  - Feedstock Coal



#### MossGas (S. Africa)

- 10 years commercial
  - 22,500 b/d+
  - Feedstock Natural Gas



#### **Shell (Malaysia)**

- 7 years commercial
  - 15,000 b/d+
  - Feedstock NaturalGas



# **Examples of Viable Rentech GTL Projects**

#### **Bolivia Stranded Gas**



#### **Indonesian Methane Complex**



16,500 B/D

#### Flared Gas FPSO



5,000-10,000 B/D

#### **IGCC / EECP Power Generation**



1,000 - 10,000 B/D

# Supplying California With Competitively Priced FTD

#### **Domestic FTD Feedstock Alternatives**

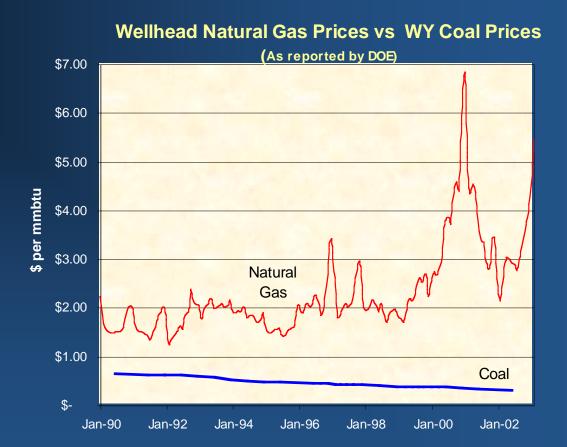
Natural Gas (>\$3.50/mmbtu)

Coal

(<\$1.00/mmbtu)

- Refinery Bottoms (<\$1.00/mmbtu)</li>
- Refuse Derived Fuel
   & Biomass

(?/mmbtu)



#### **Domestic FTD Feedstock Alternatives**

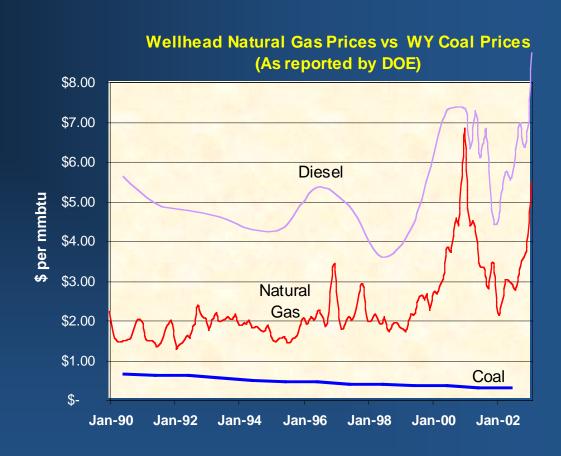
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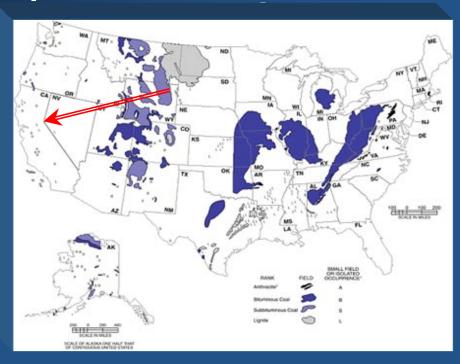
- Refuse Derived Fuel & Biomass

(?/mmbtu)



## Why Not FTD from Coal?

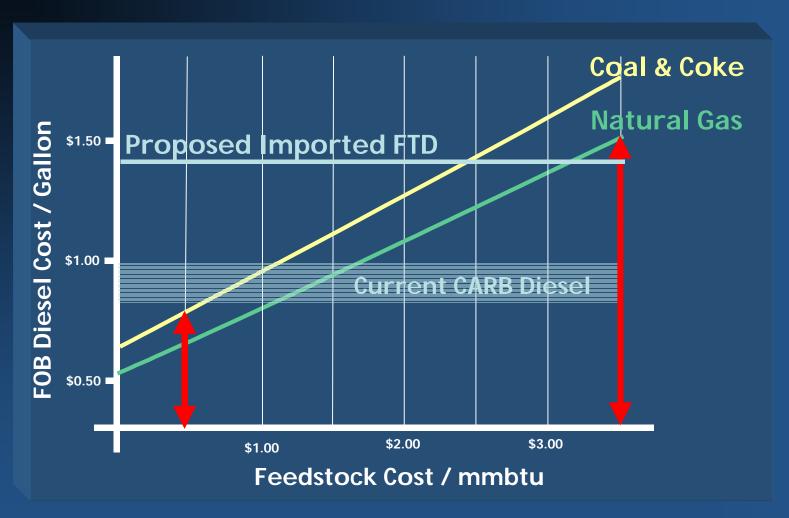
- U.S. has over 275 billion tons of coal reserves
  - The world's largest coal resource
  - Equivalent to over 20 trillion gallons of FTD
- U.S. coal is inexpensive, price stable and
- New coal-fired power plants will be required to meet growing needs
- H<sub>2</sub> can be coproduced
- Carbon dioxide is extracted and can be sequestered



# **Plant Emissions with Sequestration**

		Matural Gas Matural Chel		Sen GCC Coal		See Fration	Se Friedon	Mastration Marion
Type of Feed	Gas	Gas	Coal	Coal	Coal	Coal	Coal	
CO <sub>2</sub> – pounds per Kwh (equivalent basis)	0.95	0.37	2.10	1.88	1.24	0.97	0.22	
NOx - parts per million	3	3	150	<9	<9	<9	<9	
Sulfur Recovery _ %	-	99.9	95	98	98	>99.9	>99.9	

#### **Cost Estimates for FTD**



- •Transportation to California market may range from \$.08 to \$.20/gal
- •The price of FTD from the CEC report is \$0.10 per gallon above CARB

# Where Do We Go from Here?

## California Needs & Challenges

- Reduced air emissions
- Non-petroleum sources of transportation fuels
- Stable, competitive prices
- Reliable supplier
- Flexibility in supply

#### FTD Provider Needs & Challenges

- Reliable source of low-cost feedstock
  - Price, quality and quantity
- Long-term product sales contract (>5 years)
- Stable production off-takes
  - Steady growth from 350,000 gallons/day
  - Minimum disruption to existing

## **Proposed Wyoming Coal Project**

# Build a next generation FTD plant sourced on low-cost Wyoming coal

- Phase 1 facility at 350,000 gallons per day (gpd)
  - This represents less than 4% of CA's diesel demand
  - Ultimate capacity could be over 1 million gpd
- Secure long-term coal supply <= \$0.50 per mmbtu
- Optimize co-produced electrical generation, steam and other ancillary products including sequestered CO2
- Expedite construction to meet near-term
   California needs at current CARB diesel prices

## **Proposed Approach**

- Public-private partnership between FTD provider and appropriate CA entity to expedite project development
  - Government support mechanism to enhance project attractiveness
  - Tax parity with other alternative fuels
  - State and local government support through promotion of FTD use by their own agencies

## **Proposed Approach**

- Public-private partnership between FTD provider and appropriate CA entity to expedite project development
- Consortium of financially strong stakeholders capable of moving forward in a timely manner
  - Secure long-term agreements for feedstock supply and product off-takes
  - Develop an acceptable mechanism to allow for logical market introduction leading to steady sales growth and stable pricing
  - Obtain sufficient financial support to complete planning and construction steps

## **Proposed Approach**

- Potential stakeholders
  - Investors familiar with energy development projects
  - Fuel distributors and users willing to sign long-term agreements
  - Coal mine operators
  - Electric utilities
  - Railroads
  - Local and State Governments
  - Federal Government
  - FT technology partners

#### Summary

- FTD is Good!
  - FTD either straight run or blended is superior to CARB diesel
- FTD from coal is a viable low-cost alternative
  - The technology is proven
  - Domestic coal available at or below \$0.50 per mmbtu
  - FTD from coal can be competitively priced with CARB diesel
- Public/private support needed to move any project forward
  - Long-term contracts needed for financing,
  - Financial commitment by interested parties critical for rapid implementation
- Rentech is ready to start a FTD project <u>NOW!</u>

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